

AgroPilot

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Regulator «AgroPilot SC10»



Fig. 1. Software interface for Android devices.

The AgroPilot SC10 is a versatile programmable regulator for process control, designed for use as equipment for automatic section control of liquid or dry material delivery and application rate. It features Bluetooth, RS-232, and LPD433 interfaces. The regulator is custom-built to order, based on the technical specifications provided by the customer. Order forms and software are available on the website: <https://AgroPilot.App>.

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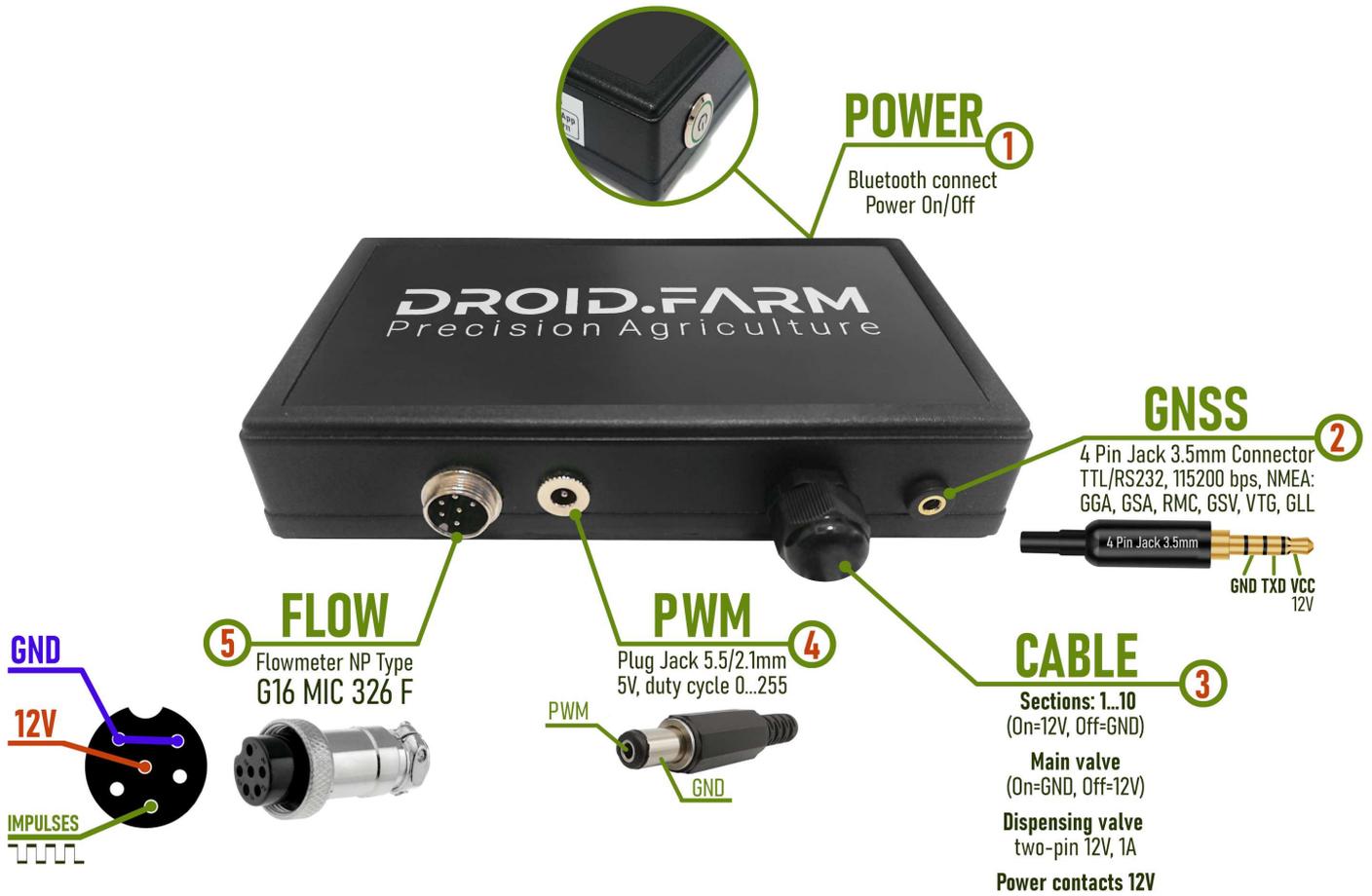


Fig. 2. External view of SC10 (not to scale 1:1)

- 1 — Power button with indicator: Turn the device on after the system is installed.
- 2 — 4-pin 3.5mm jack connector: For receiving NMEA data from external receivers.
- 3 — Automation control cable: Includes connections for section valves, metering valve, and main valve.
- 4 — PWM output: For connecting an electric pump driver, actuator, etc.
- 5 — G16 MIC 336 M connector: For connecting a pulse sensor.



The equipment can be supplied with distributors based on ARAG automation.



distributors assembled with solenoid valves,



kits for retrofitting mechanical distributors.

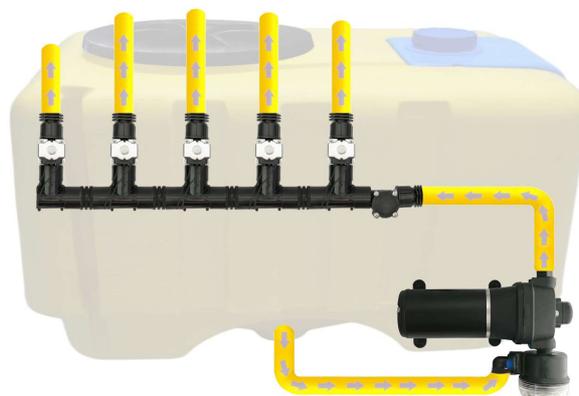


Universal regulators with automatic section control for liquid application include two dosing technologies:

Регулирование «краном-дозатором» в системах с механическими насосами мембранно-поршневого типа.



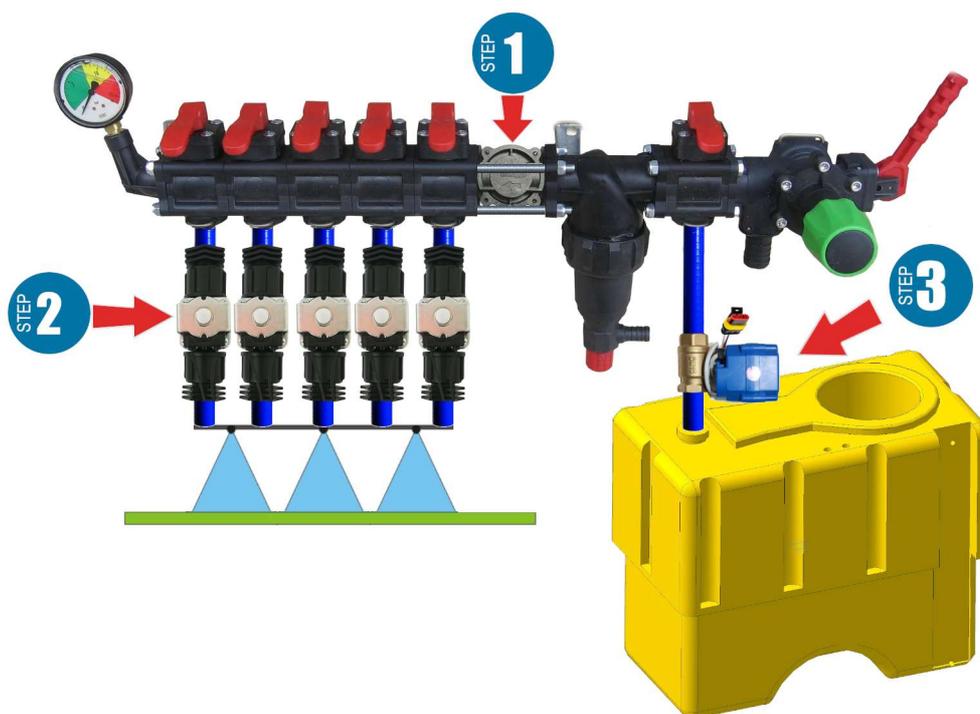
Электрическое регулирование широтно-импульсной модуляцией (оборотами электрического насоса).



ШИМ технология имеет ряд преимуществ в сравнении с электромеханической дозировкой: экономия от 500 г топлива на 1 га (не использует ВОМ), срок службы насоса выше, простота установки, автоматическое управление и калибровка.

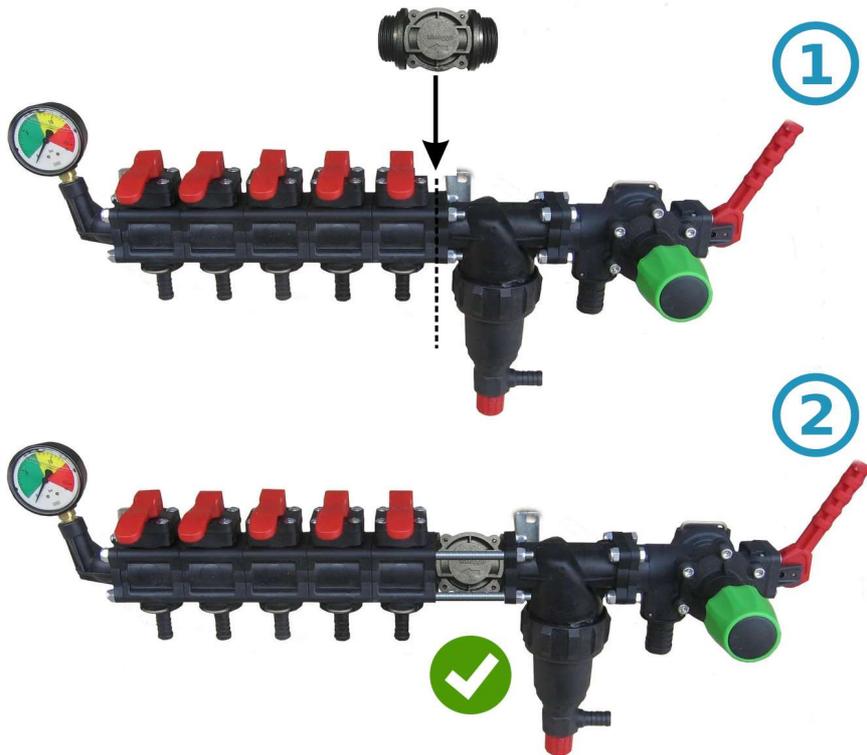
To retrofit a sprayer with a mechanical pump, only 3 simple steps need to be completed:

- 1) — Install the flowmeter before the distributor sections.
- 2) — Install the section electric valves immediately behind the section outlets or place them on the sprayer boom, dividing it into equal sections.
- 3) — Position the metering valve at the section outlet before the filter, and route the hose from the metering valve to the top of the tank for free pressure release.

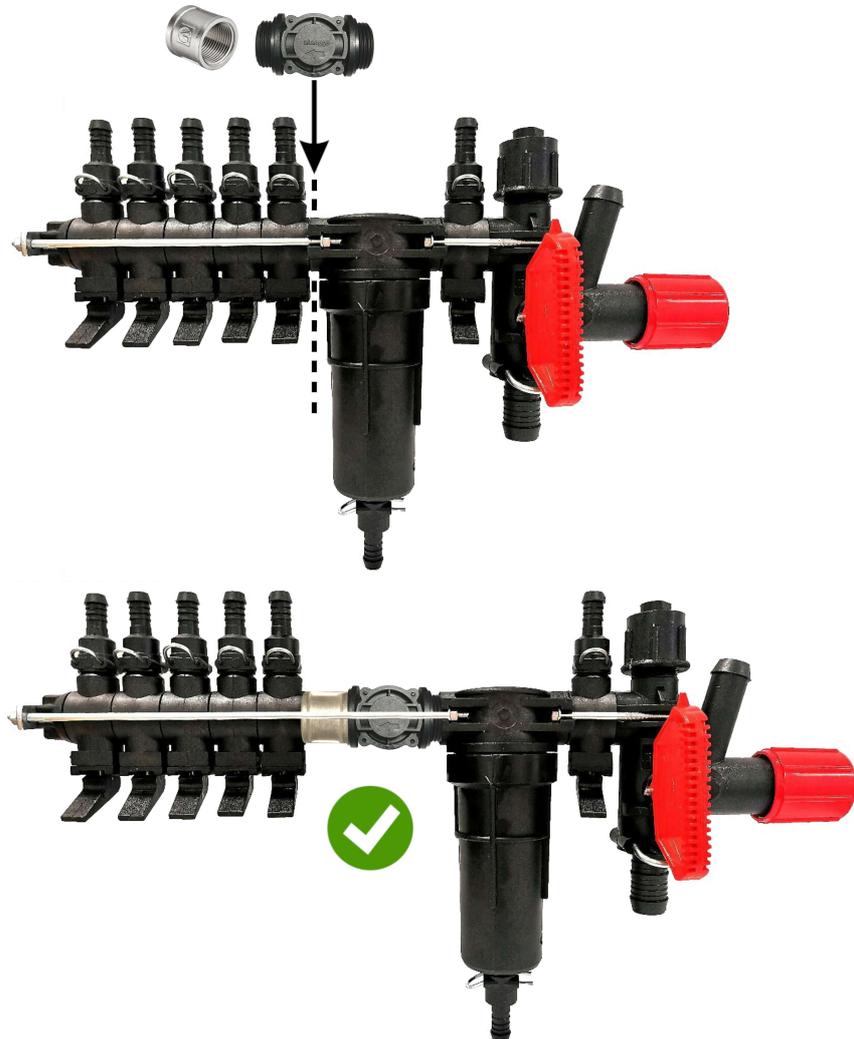


Flowmeter Installation

The flowmeter is installed in an ARAG-type distributor, before the sections.

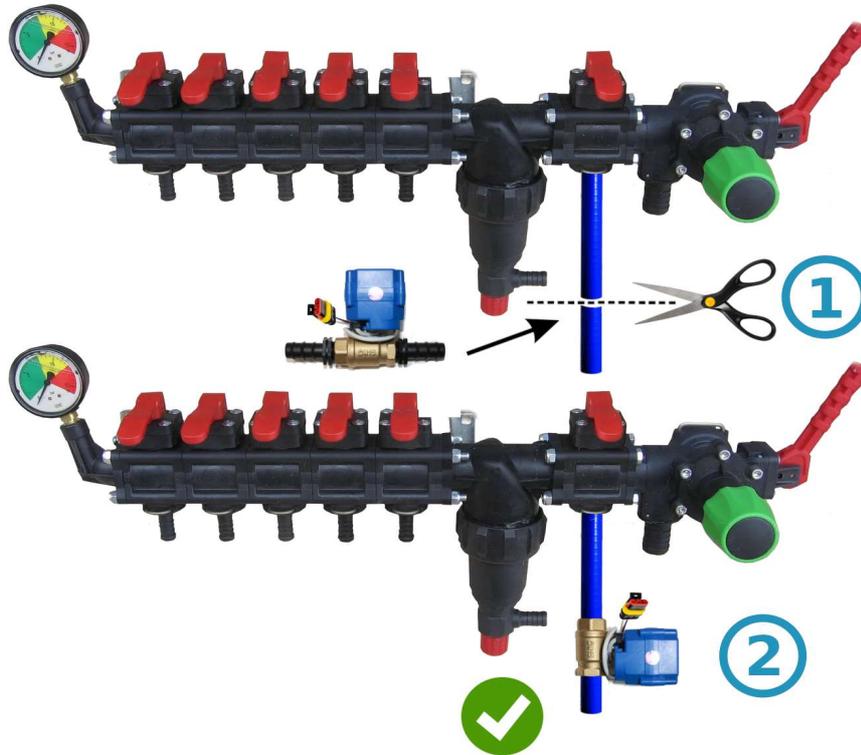


For a distributor of a different type, a 1" coupling is installed before the flowmeter.



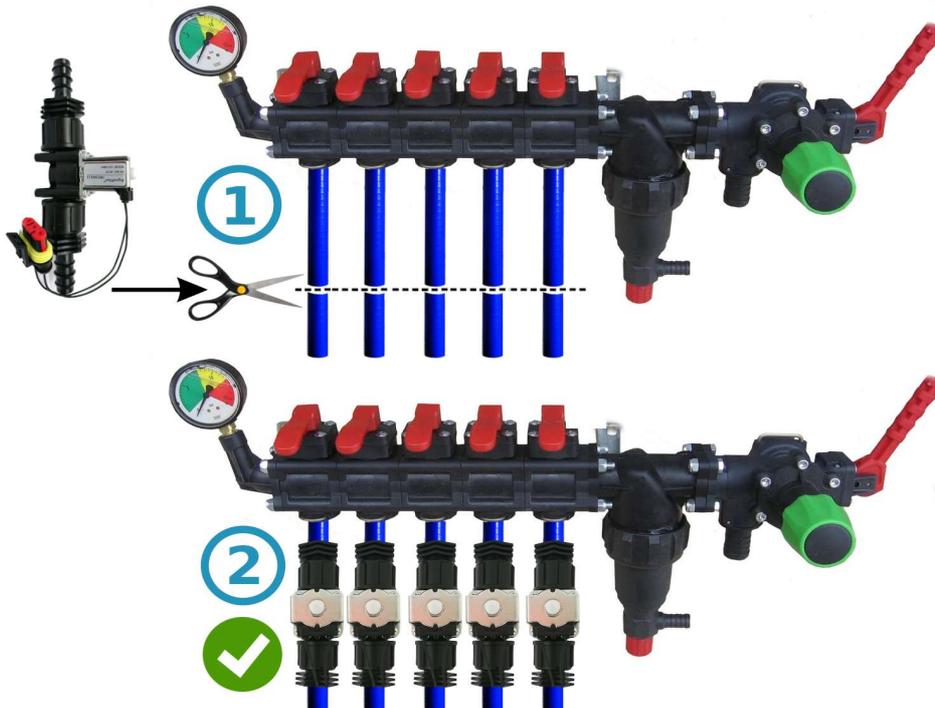
Metering Valve Installation

The metering valve is installed at the outlet of an additional section before the filter, or if that section is not present, directly before the flowmeter in the pressure distributor. The hose from the metering valve should be routed to the top of the tank. After turning on the SC10, ensure that the metering valve fully closes. If the valve opens, swap its contacts.

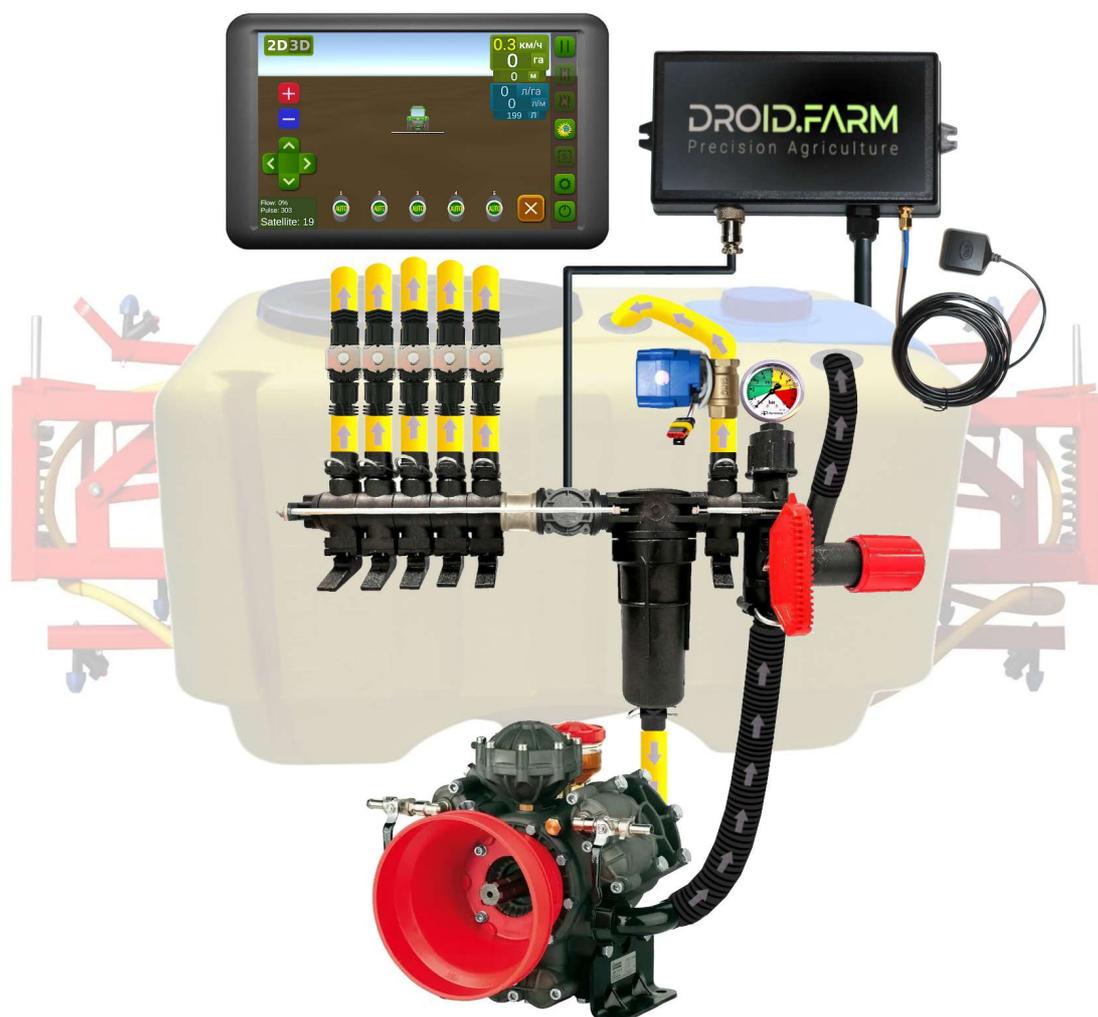


Installation of Section Valves or Taps

Electric section valves and taps can be installed immediately after the pressure distributor or mounted on the sprayer boom, dividing it into equal sections.



General Connection Diagram for the Pressure Distributor of the Sprayer:



When using the SC10 for controlled dispensing of plant protection products along with regulators that have section pressure compensators (marked as №1 in the diagram), these compensators must be closed to prevent liquid from flowing back into the tank through outlet №2. The regulator calculates the actual liquid dispensed through the sections and, after section shutdown, automatically adjusts the system pressure without the need to use pressure compensators.



Start working in two simple steps:

- 1) — Secure the GNSS receiver at the center of the equipment's roof, and place the SC10 regulator in the tractor cabin (wireless LPD433 version on the equipment).
- 2) — Supply power from the 12V network of your vehicle to the receiver and the SC10.

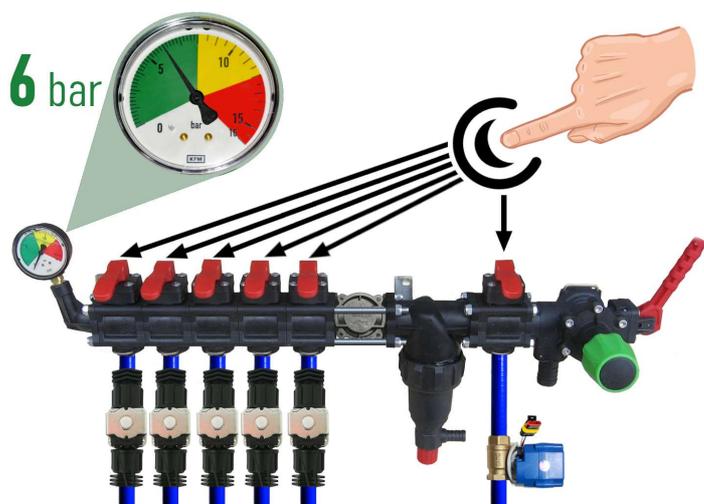


To work with our equipment, use the software for Android devices. Download the APK version of the AgroPilot program from the website <https://AgroPilot.App/Instruction>. Install and launch the application, enable Bluetooth and the internet connection. Activation is simple: enter the 8-digit serial number of your device and the PIN code (found in the manual and on the serial sticker). Minimum device requirements: Android 5.0, 1 GB RAM; recommended: 4 GB RAM, 8-core processor.



A detailed user guide for the program is available on the official website: <https://AgroPilot.App/Instruction>

Setting the Maximum Pressure in the Regulator and System Testing Before Starting Work

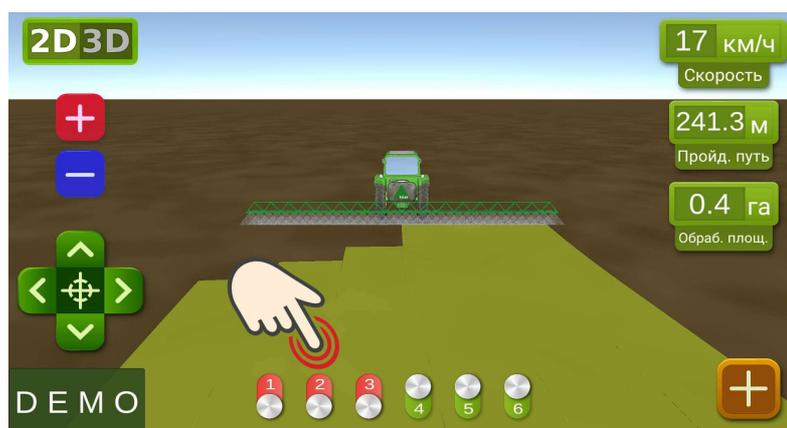


Before starting the system, fill the tank with clean water and set the maximum pressure on the regulator. Close all section valves, turn on the pump, and set the maximum allowable pressure for your sprayers, using the pressure gauge as a guide (standard is 6 bar). After setting the pressure, open the section valves. Depending on the speed of the equipment, while maintaining the required application rate of plant protection products, the system will regulate the pressure from 0 to the set value, releasing excess pressure back into the tank through the metering valve.

While stationary, turn on the pump, select the "Spraying" work type in the program, and wait for the system to detect the satellites. Press the "Play" button (start work). Go to the "Fertilizer Application Rate" settings and specify the required application rate per hectare, with a minimum speed of less than 2 km/h. This will activate "TEST" mode. Adjust the maximum speed parameter (e.g., from 1 to 20 km/h); the liquid flow rate from the sprayers will change from minimum to maximum, while the discharge through the metering valve will change inversely, from maximum to minimum (at high speeds).



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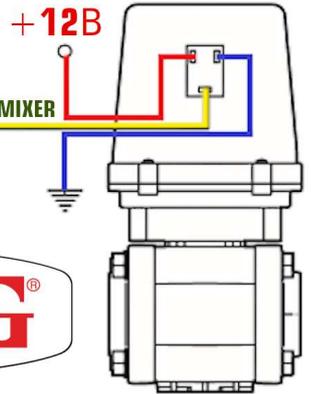
operational mode, it will limit the application rate for speeds above the maximum.

On the working screen, manually check the section automation by turning them on or off using the virtual switches. After testing the system, return to the "Fertilizer Application Rate" settings and set the minimum speed to 2 km/h. The system will switch to operational mode, and the sections will activate as soon as the speed exceeds 2 km/h. Set the maximum speed to a value above which you do not intend to apply the liquid; in

Connecting ARAG Automation

SC10 regulators are designed with versatility in mind, allowing any specialized equipment to be connected to the regulator's contacts. To connect original ARAG equipment to the SC10 unit, use the following diagram or an SC10 regulator with DIN 43650 connectors.

Схема підключення 3-х контактних електричних приводів ARAG до контактів регулятора AgroPilot SC10.

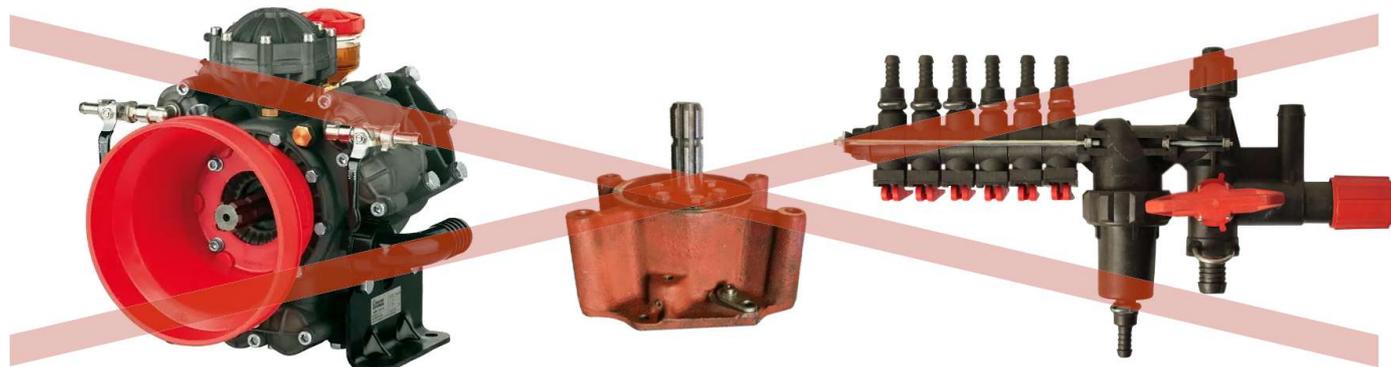


When using the SC10 for controlled dispensing of plant protection products, along with ARAG regulators that have section pressure compensators, these compensators must be closed to prevent liquid from flowing back into the tank. The SC10 calculates the actual liquid dispensed and, after section shutdown, automatically adjusts the system pressure without the need to use pressure compensators.



General Scheme for Retrofitting a Sprayer for Plant Protection Product Application with Electric Pumps

SC10 regulators are equipped with PWM technology for high-precision application of agrochemicals or fertilizers, eliminating the need for expensive sprayers. Affordable slot or injector-type sprayers are suitable. The PWM technology does not require a diaphragm-piston pump, as the regulator is paired with an electric pump, eliminating the need for a power take-off (PTO). Additionally, a specialized distributor with a pressure regulator is not required.

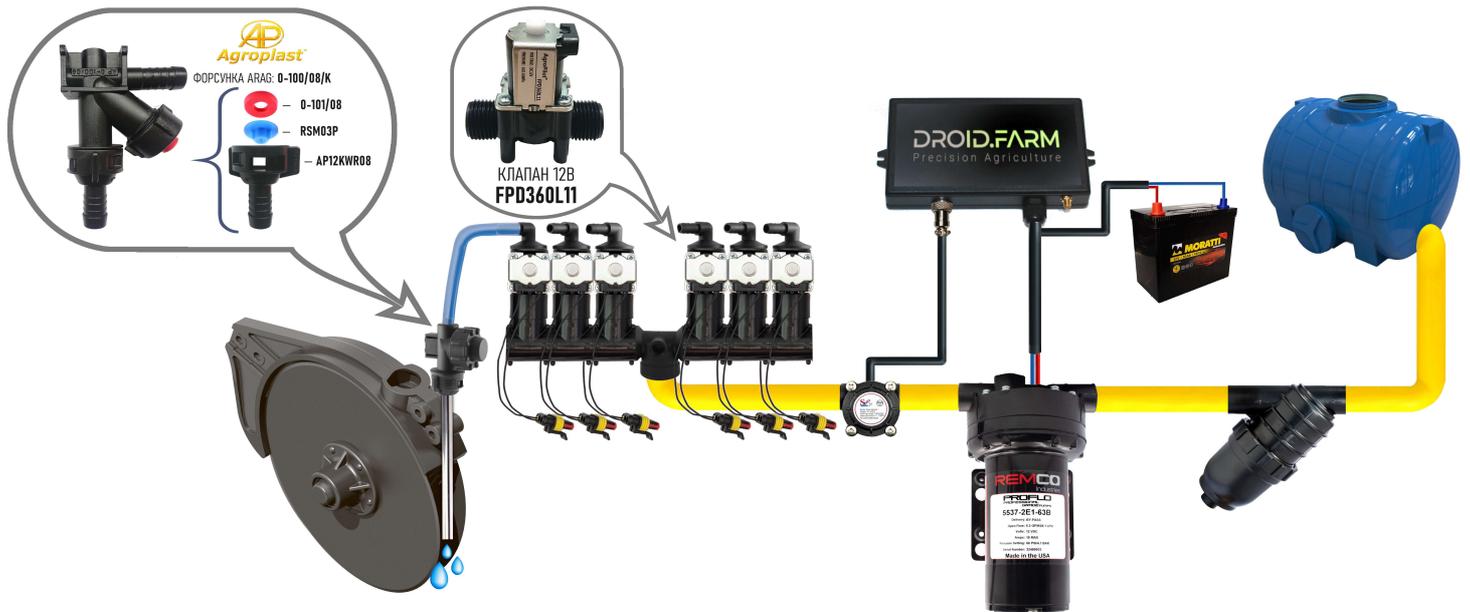


The SC10 regulates liquid application through the revolutions of the electric pump. The kit includes an electric distributor with valves for automatic section control. Installation is straightforward: the liquid supply from the tank is connected to the inlet of the self-priming pump, and the pump's outlet is connected to the sprayer boom sections.



Retrofitting a Seeder or Cultivator for Liquid Fertilizer Application

Automatic application of liquid fertilizers with seeders or cultivators is supported by SC10, which is compatible with various electric pumps operating on 12V to 24V power. The connection scheme is simple: the pump is connected to a dedicated output on the controller. A flowmeter is installed after the pump, allowing the regulator to receive data on consumption and dispense the calculated application rate based on the actual movement speed.

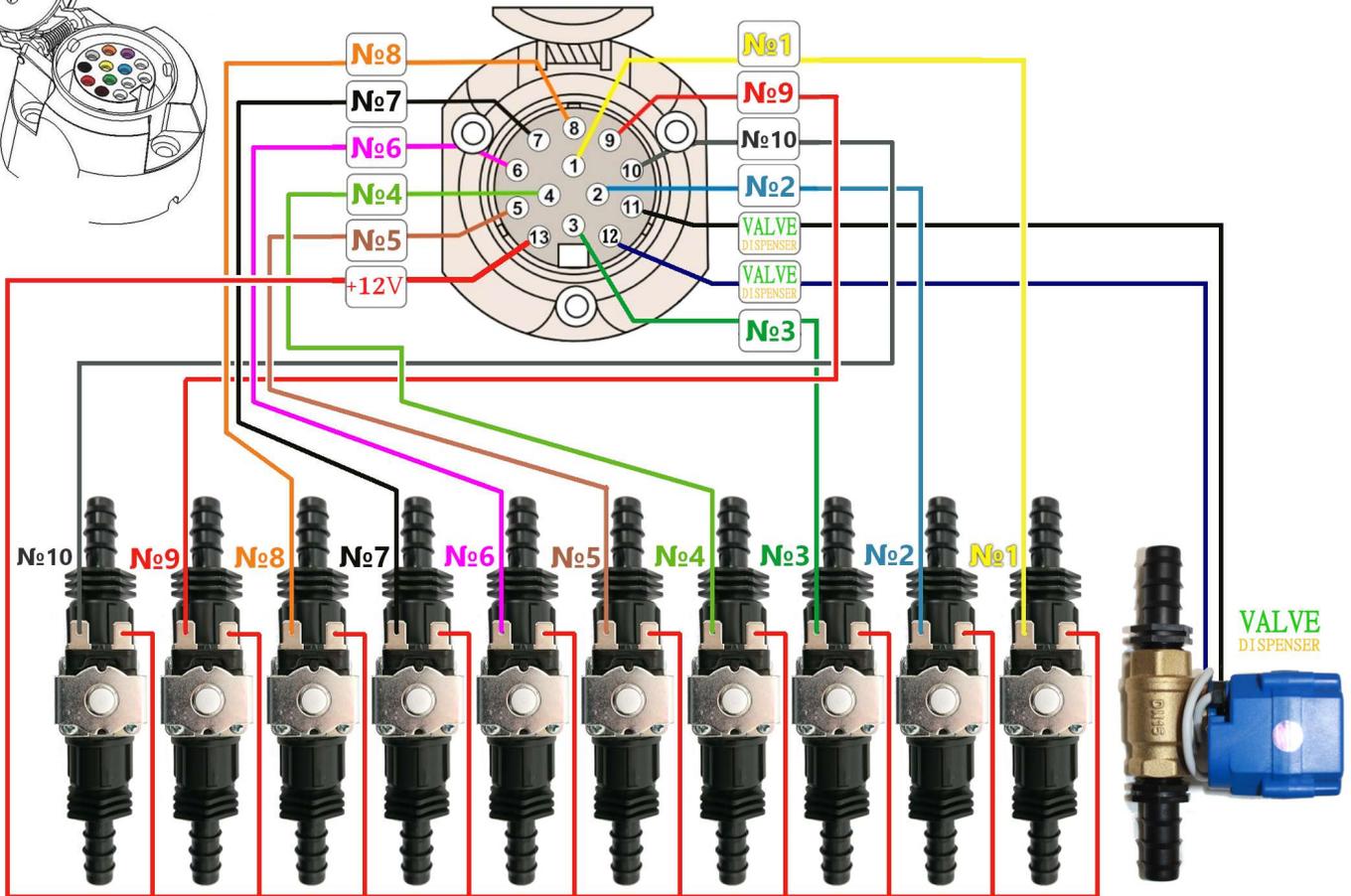


To identify clogged channels, visual ball indicators (rotameters) are used. In a budget-friendly liquid fertilizer application system, you can use the SC10 regulator with any number of sections by selecting only one section in the settings. The flow can then be divided into the required number of sections using a WILGER distributor.

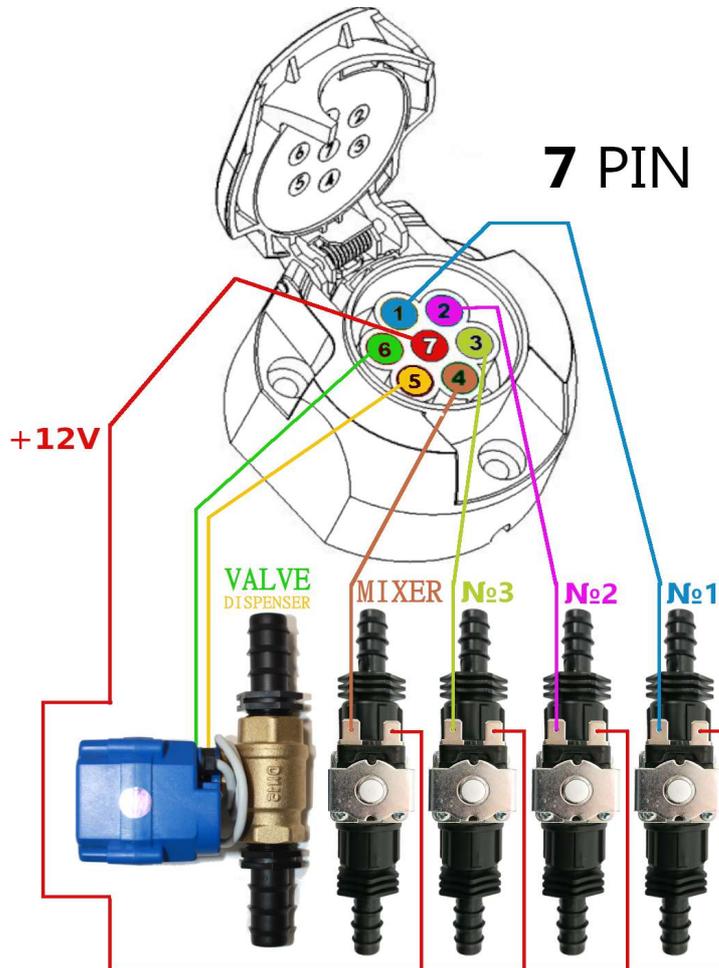




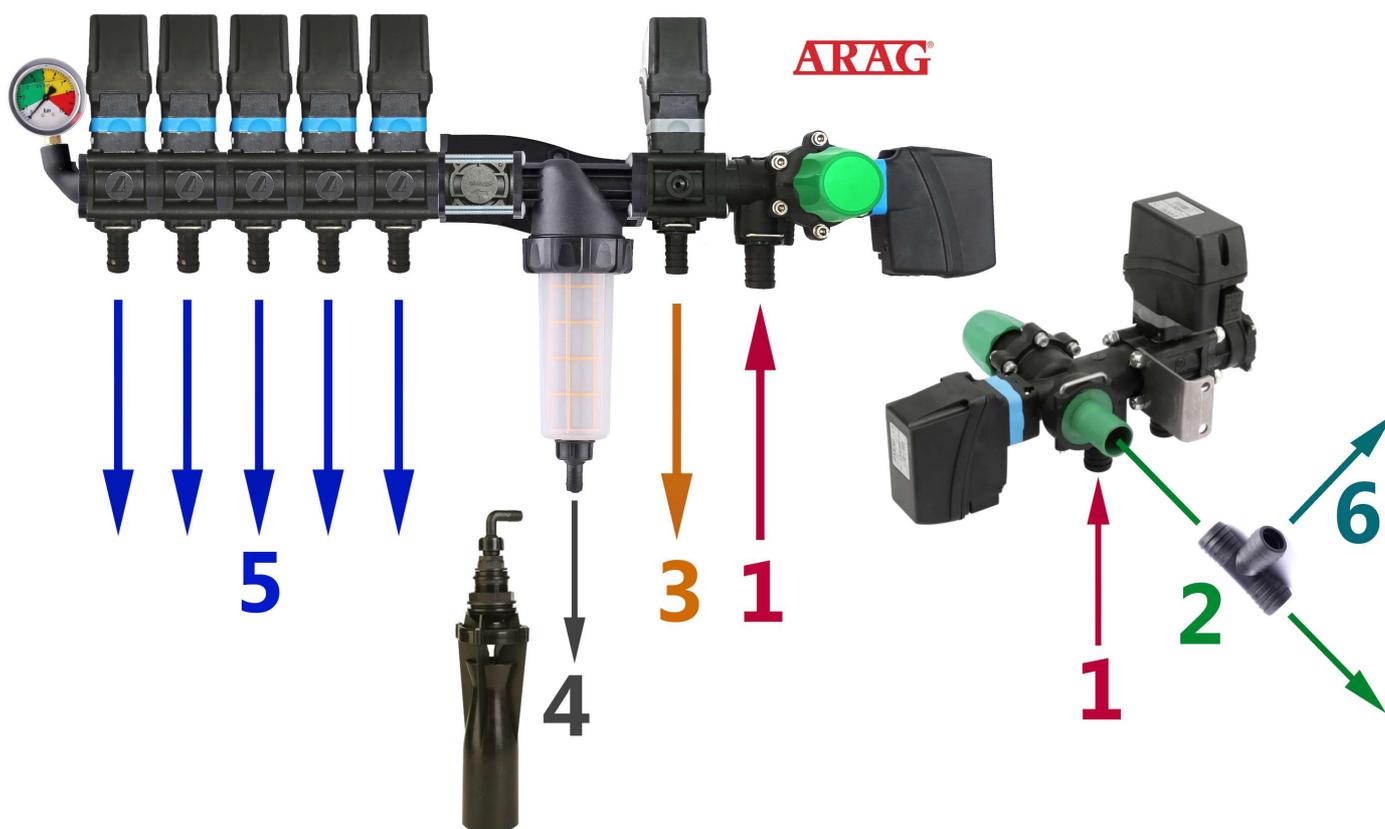
13 PIN



7 PIN



Purpose of liquid inlets and outlets in the pressure distributor



1 — The liquid supply from the pump is connected to inlet №1.

2 — Excess pressure from the pump is discharged through the maximum pressure valve to the top of the tank. If the system is set to a maximum pressure of 6 bar, any excess produced by the pump will be discharged through outlet №2. Additionally, all liquid produced by the pump will be discharged through this outlet when the distributor is turned off.

3 — Excess pressure from the precision application system's metering valve is discharged to the top of the tank. The metering valve proportionally divides the system's pressure, releasing the excess. For example, if the system is set to a maximum pressure of 6 bar but currently requires 3 bar for precise application, the excess liquid will be discharged through outlet №3. The metering valve adjusts the working pressure at a rate of up to 10 Hz (10 times per second), changing the valve position to increase or decrease the release of excess liquid from the system.

4 — Liquid supply to the lower agitator. Before starting the system, ensure that flow restrictors are installed on the agitator. If liquid flows freely from the filter, the necessary working pressure in the system may drop.

5 — Section valve outlets are connected to the corresponding sprayer sections.

6 — For connecting additional agitators and ensuring stable operation of the automatic dosing system, you can install a tee on outlet №2 and connect them through outlet №6. Avoid installing additional sections for agitators in the system, as this may disrupt the system's working pressure regulation. Instead, supply them from the discharge of the maximum pressure valve.